Wave-front in photonic crystals: Influence of the form-anisotropy

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Photonic crystals possess strong dispersion and anisotropy. Anisotropy of a photonic crystal leads to the beam steering effect: the group-velocity direction does not necessarily coincide with the wave-vector direction. As a consequence the wave-front due to a point isotropic light source can be strongly non-spherical inside a photonic crystal (Fig. 1). In this contribution, a theoretical study of wave-front images in a photonic crystal is presented based on numerical finite-difference time-domain (FDTD) calculations and asymptotic analysis of the Maxwell's equations. Numerical examples are given for 2D and 3D periodic dielectric structures.

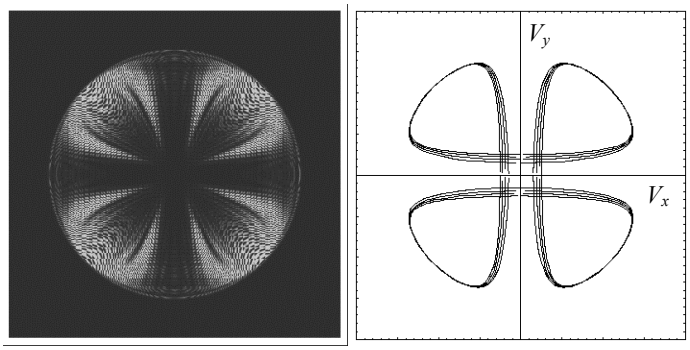

Figure 1. FDTD wave-front image (left) and group velocity contours (right) of the light pulse propagating inside 2D polymer photonic crystal.